

**NAVAL STATION NEWPORT
RESTORATION ADVISORY BOARD MEETING
February 20, 2002**

MINUTES

On Wednesday, February 20, 2002, the NAVSTA Newport Restoration Advisory Board (RAB) gathered at the Officers' Club for its monthly meeting. The meeting began at 7:10 p.m. and ended at 9:35 p.m.

In attendance were John Vitkevich, Shanna Jennison, Claudette Weissinger, Manuel Marques, John Lennon, Dr. D.K. Abbass, David Brown, Jim Myers, Emmet E. Turley, Thurston Gray, Ed Moitoza, Mary Blake, David D. Dorocz (NAVSTA), LCDR Nick Merry (NAVSTA), Melissa Griffin (NAVSTA), Lillian Orleans (NAVSTA), Greg Kohlweiss (NAVSTA), Stephen Granger (URI), Jim Shafer (EFANE), Phil Colarusso (USEPA), Kymberlee Keckler (USEPA), Dr. Pam Harting-Barrat (USEPA) and Mike Gitten (ESS).

John Vitkevich opened the meeting and welcomed the group. He introduced Lillian Orleans, who will be the Secretary Pro Tem, due to Tom Krantz' resignation.

MEETING MINUTES

The January meeting minutes were approved, with the following changes submitted by Kymberlee Keckler:

1. Please change "Ms. Pam Harting-Barrat USEPA" to "Dr. Pam Harting-Barrat USEPA".
2. Please change "...Ms. Keckler added that one could place the information on the web and make names available of people that can help interpret the data..." to "Ms. Keckler recommended that the information on the web be linked to contact names of people that can help interpret the data and progress reports or fact sheets. She also recommended that the data be presented concomitant with regulatory standards so as to provide a reference for the concentrations."
3. The second reference to "START OF RAB MINUTES" should read "END OF RAB MINUTES".

ACTIVITY UPDATE - JAMES SHAFER

Jim Shafer reviewed the status of all the sites. He also presented a preview of the work to be done. At the next RAB meeting, there will be a presentation of the results of the eelgrass recovery data from the Old Firefighter Training Area. After the next RAB meeting, the revised Feasibility Study for 2002 will be submitted. The next step will be to submit the Draft Plan to the EPA and the State of RI. The Remedial Action Plan is scheduled for 2004. See Enclosure (1).

Mr. Shafer then discussed the McAllister Point Landfill offshore area. During the last site walk-over, some miscellaneous debris was found in the northern area. They are looking for an opportune time to remove this debris. Kymberlee Keckler described it as vitrified landfill debris, such as rubber hoses, broken glass, etc. Once this is complete, they will proceed with the Final Closeout Report. See Enclosure (1).

It was mentioned that approximately \$1 million dollars was spent for the eelgrass restoration, which includes the studies and the transplants. Steve Granger was asked what the success rate was with the prior eelgrass transplantation. He mentioned that his presentation today was to be about the importance of eelgrass and its present distribution, but that he could come back at a later time with information on the success rates. He will provide the RAB with success reports in April and mid-summer regarding eelgrass restoration. The \$1 million dollars for eelgrass restoration is part of the total cleanup cost of \$8.5 million. See Enclosure (1).

At McAllister Point - Onshore Area, the monitoring of the landfill gases and groundwater will continue. This summer, a revised Onshore Maintenance Plan will be submitted, to include the monitoring of the offshore area as well as the onshore area. See Enclosure (1).

At Melville North, the remedy was completed in 2001. The final report was submitted to RIDEM a few weeks ago, and is waiting for approval. See Enclosure (1).

At Gould Island, under TSCA, we plan to do a PCB removal action at various locations around the IR sites.

We are scheduled to submit a Draft Remedial Investigation Work Plan in January 2003. See Enclosure (1).

At Derecktor Shipyard, the onshore area is nearing completion, having undergone various removal actions that totaled approximately \$1 million dollars. The offshore area still needs to be addressed, as contamination is present in the sediment. The next step is to submit a Draft Proposed Plan for public viewing in January 2004. Kathy Abbass asked if the natural gas pipeline was operational. She wanted to know if there was supposed to be a buffer beside the line for spill containment. Dave Dorocz and LCDR Nick Merry spoke of how there is only liquefied natural gas in the pipes, and that if there were to be a leak, the liquid would evaporate and rise into the air. The only spill containment for that area relates to equipment and machinery. Melissa Griffin was asked what would happen with the ships now docked at the shipyard if remediation is needed offshore. She said that the Deep Draft Berthing Facility Site Plan includes a plan to move the ships from the site to facilitate remediation. See Enclosure (1).

At the NUSC Disposal Area, the next step is to submit a Draft Site Inspection in March 2003. No work has been done there yet. Work is scheduled to begin on this area and Gould Island in 2003. Questions about cost were raised. The cost could fluctuate: a better estimate of the actual cost will come after the Site Inspection is complete. See Enclosure (1).

At the Coddington Cove Rubble Fill area, no work has been done yet - it is scheduled to begin in 2004. The same start date applies to Tank Farms 1, 2, 3, and 4. At Tank Farm 5, the Round 4 data results (re: the groundwater issue at Tanks 53 and 56) were submitted in September 2001. The final Technical Memorandum, which summarizes the analytical results from the fourth round of sampling at Tank 53, was submitted in January 2002. See Enclosure (1).

Dave Brown asked if there was still regular communication between the Navy and the regulators. Mr. Shafer responded that communication on technical issues was ongoing mainly via e-mail and phones. Emmet Turley asked if any of the properties were ready to be given back to the public. Mr. Shafer replied that none of the sites are

close to that stage yet. Dave Dorocz informed the group that the Navy has no plans to excess any of the properties.

EEL GRASS REGULATIONS - PHIL COLARUSSO

Phil Colarusso talked about the significance of eelgrass. Eelgrass is a shallow water coastal plant. It is found in the inner tidal coastal areas to 40 ft. below (with clear water). Eelgrass provides a habitat for fish and filters excess nutrients out of the water. It is found from Nova Scotia south to North Carolina. A cut-away slide showed that eelgrass provides carbon in the form of "detritus" to sea life. David Brown asked to have "detritus" defined - Mr. Colarusso described it as being organic material formed from the aging process, which becomes bottom deposits and suspended matter. The suspended matter contains high levels of carbon. Suspension feeders will in turn take this in, and high levels of carbon result in high levels of fish reproduction. Its restoration would also assist in preventing shoreline erosion. It is a coldwater plant, comprised of rhizomes connected together growing in thick patches, similar to meadows. The rhizome system is what holds the sediment in place. There have been 43 species found in and around the Boston area. See Enclosure (2).

Issues that hinder the growth process would include dredging and filling, boating impact/prop scars, fishing equipment getting caught and docks being built (causing shade impact - eelgrass needs sunlight to thrive). See Enclosure (2).

Mr. Brown also asked if there has been any attempt to elevate the breed (to create higher yielding varieties). Mr. Colarusso explained that eelgrass is protected under the Clean Water Act, Section 404. The EPA has developed a policy of "no net loss of wetlands", in which they take a three prong approach: 1. Avoidance of any possible disturbance; if avoidance is not possible, then Minimization of any disturbance; with Mitigation being the required final step (replacement of vegetation). This act was developed in reference to the Federal Wetlands Protection Policy. See Enclosure (2).

When transplanting, every attempt is made to take plants that may be lost where dredging will occur. If that is not possible, then the next preference is to use donor

beds as close to the transplant site as possible. If none can be retrieved this way, then it is recommended to take plants from multiple donor sites, to increase the variety in the new bed. Mr. Brown asked how fast the regrowth process took. Steve Granger (URI) answered that eelgrass is a slow-growing plant, and it may take 6 to 10 years to replace a substantial size bed. Kathy Abbass discussed the possibility of human intervention being part of the cause of the eelgrass decline in the 1930's, as it was commonly used in farming and to feed horses. See Enclosure (2).

EEL GRASS OVERVIEW - STEVE GRANGER

Steve Granger told the RAB about the ecological role of eelgrass, URI's effort to grow the plants from seed, what controls where eelgrass grows, and what water quality or other issues might arise. He showed maps of Narragansett Bay with the location of the eelgrass beds highlighted. Their original plan was to re-vegetate the area north of McAllister Point that was damaged by dredging. They planted some test plots south of Carr's Point, against the gradient going towards the shore, and in the current that flows through that area, to see whether they would survive, spread or reproduce. Five grids were placed in that location, but three of the five were later found pulled up, so the site work there was abandoned. Kathy Abbass mentioned that the area north of McAllister Point contains a debris field from a 1778 shipwreck. She said that the R.I. Marine Archaeology Project was interested in excavating the site for historical purposes. If the transplants had taken, the Historical Society would have been prohibited by law to do their excavations. She requested that there be communication between URI and the RI Historical Society, and any other parties interested, before any mitigation work is done in the future. See Enclosure (3).

Mr. Granger reiterated the fact that eelgrass needs clear, cool water to thrive. There is little known about its growth habits at this time. It produces carbon, which helps the fish and shellfish populations (clams will grow faster in an eelgrass bed than out of one). The original method for transplanting the eelgrass was to attach the plants to a plastic grid system that is weighed down. Once the plants have taken root, the grids are removed. This can be accomplished by attaching the plants to the grids

with paper ties that dissolve gradually in the water. See Enclosure (3).

They have found that, even though it is a difficult process, reseedling can regenerate this type of plant. The seeds are produced in abundance every year. By harvesting only 2%-3% of the available seeds, there is no need to take plants from other beds. Up to a million seeds can be collected in an afternoon with a couple of divers. They collect the flowering stalks from some of the plants in the bed. These are the stalks that hold the seeds. They put them in holding tanks until the stalks release the seeds, then use special screens to separate the seeds from the plant material. The seeds can be held for about a month. The best time for planting seeds is between September and October - some will germinate at that point, and others will wait until Spring. For the mitigation of mature plants, May is best. In both cases, the ideal temperature is 10 - 12 degrees Celsius. See Enclosure (3).

They have developed a pump that is attached to a system of tubes about one meter wide, which is used to plant the seeds on the ocean floor. The seeds are suspended in a natural, gel matrix, and dispersed through the tubes. A winching boat pulls the pump along. There is an attachment that covers the seeds with 2-½ cm. of sediment after they are dispersed. See Enclosure (3).

NEW BUSINESS

The RAB website has been revised and updated.

Mr. Eugene Love and Ms. Elizabeth Mathinos have tendered their resignations. A new Public Information Committee Chair will be needed.

Mr. John Bernardo still needs to sign the Charter.

COMMITTEE REPORTS

PROJECT COMMITTEE

Mr. Emmet Turley gave his project report. He submitted copies to be included in this report. See Enclosure (4).

MEMBERSHIP COMMITTEE

No report. Committee Chair was not present.

PUBLIC INFORMATION COMMITTEE

Mr. Eugene Love has resigned. A new Public Information Committee Chair is needed.

PLANNING COMMITTEE

Mr. Moitoza informed the RAB that the OFFTA results will be discussed at the next meeting.

EDUCATION COMMITTEE

Dr. Abbass is in the process of developing an educational packet for new RAB members. She is working on a portion of the packet that provides an overview of why the RAB was formed. She gave this portion to Mr. Dorocz to review. Other areas to be addressed will be assigned to members of the RAB who would like to assist.

NEXT MEETING

The next meeting of the Restoration Advisory Board (RAB) is scheduled for Wednesday, **March 20, 2002**, at 7 p.m., at the Officers' Club.

The meeting was adjourned at 9:35 p.m.

Enclosures:

- (1) Activity Update
- (2) Eelgrass Regulations
- (3) Eelgrass Overview
- (4) Project Committee Report

Installation Restoration Sites

Naval Station Newport

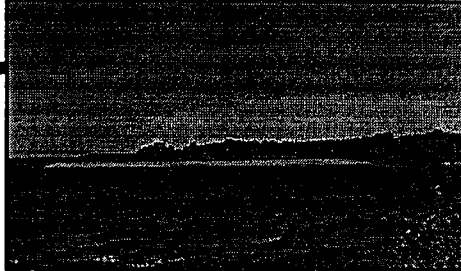
Old Firefighting Training Area



- *Contaminants:* Polyaromatic Hydrocarbons (PAHs), Metals, Dioxin, Total Petroleum Hydrocarbons (TPH)
- *Total Cleanup Costs:* \$8.7 Million
- *Estimated Completion:* 2005
- eel grass sediment results Feb 02
- *Next Step:* Revised FS March 2002

ENCLOSURE 1

McAllister Point Landfill - Offshore



- *Contaminants:* Polychlorinated Biphenyls (PCBs), Metals, PAHs
- *Total Cleanup Costs:* \$8.5 Million
- *Next Step:* Project Closeout Report Aug 2002/ Draft O&M Plan Summer 2002

McAllister Point Landfill - Onshore



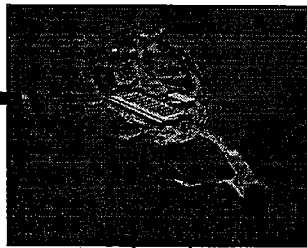
- *Contaminants:* PCBs, Metals, PAHs, TPH
- *Total Cleanup Costs:* \$12 Million
- *Remedy Completed:* 1996
- *Next Step:* Continue Long-Term Monitoring for Landfill Gas/ Groundwater until 2026
- \$200K/year

Melville North Landfill



- *Contaminants:* Metals, PCB's, TPH
- *Total Cleanup Costs:* \$7 Million
- *Remedy Completion:* 2001
- *Next Step:* Need Approval on Closure Report (Submitted Final Report Feb 02)

Gould Island



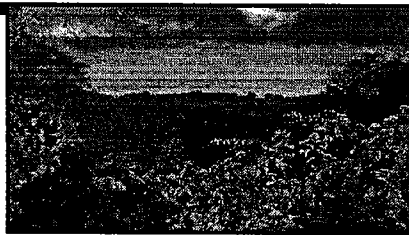
- *Contaminants:* Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Metals, Cyanide, TPH, PCBs
- *Total Cleanup Costs:* \$4.3 Million
- *Estimated Completion:* 2009
- *Next Step:* Draft (RI) Work Plan January 2003
- TSCA PCB removal planned Spring 2002

Derecktor Shipyard



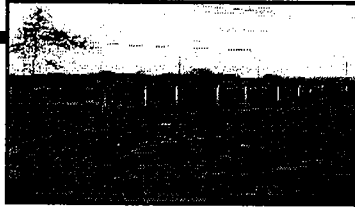
- Onshore:
 - *Contaminants:* VOCs, TPH, PCBs, Metals
 - *Total Cleanup Costs:* \$1 Million
- Offshore:
 - *Contaminants:* Semi Volatile Organic Compounds (SVOCs), PCBs, Metals
 - *Total Cleanup Costs:* \$16.1 Million
- *Estimated Completion:* 2008
- *Next Step:* Draft Proposed Plan January 2004

NUSC Disposal Area



- *Contaminants:* Metals
- *Total Cleanup Costs:* \$4.8 Million
- *Estimated Completion:* 2010
- *Next Step:* Draft Site Inspection (SI)
March 2003

Coddington Cove Rubble Fill



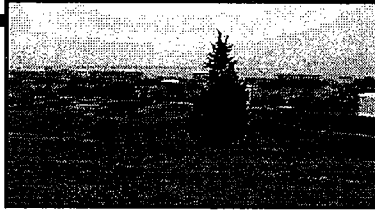
- *Contaminants:* Metals
- *Total Cleanup Costs:* \$2.8 Million
- *Estimated Completion:* 2009
- *Next Step:* Draft SI Work Plan June 2004

Tank Farm 1



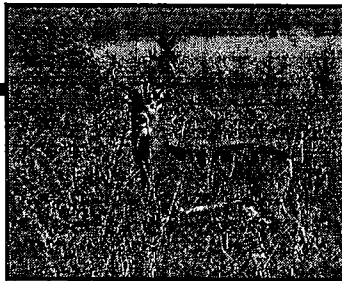
- *Contaminants:* PAHs, VOCs, Metals, TPH
- *Total Cleanup Costs:* \$1.4 Million
- *Estimated Completion:* 2012
- *Next Step:* Draft SI Work Plan February 2004

Tank Farm 2



- *Contaminants:* PAHs, VOCs, Metals, TPH
- *Total Cleanup Costs:* \$1.5 Million
- *Estimated Completion:* 2012
- *Next Step:* Draft SI Work Plan February 2004

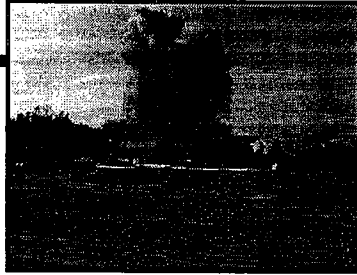
Tank Farm 3



- *Contaminants:* PAHs, VOCs, Metals, TPH
- *Total Cleanup Costs:* \$1.3 Million
- *Estimated Completion:* 2012
- *Next Step:* Draft SI Work Plan February 2004

ENCLOSURE 1

Tank Farm 4



- *Contaminants:* PAHs, VOCs, Metals, TPH
- *Total Cleanup Costs:* \$850k
- *Estimated Completion:* 2009
- *Next Step:* Draft RI Work Plan March 2004

Tank Farm 5



- *Contaminants:* PAHs, VOCs, Metals, TPH
- *Total Cleanup Costs:* \$850K
- *Estimated Completion:* 2009
- Round 4 Data submitted SEPT 2001
- *Next Step:* Final Tech Memo-Jan 02

Eelgrass, *Zostera marina*

- Shallow water coastal plant
- Atlantic U.S. Range is from North Carolina to Canada
- Reproduction is sexual and asexual
- Can grow in isolated small patches to extensive thick meadows



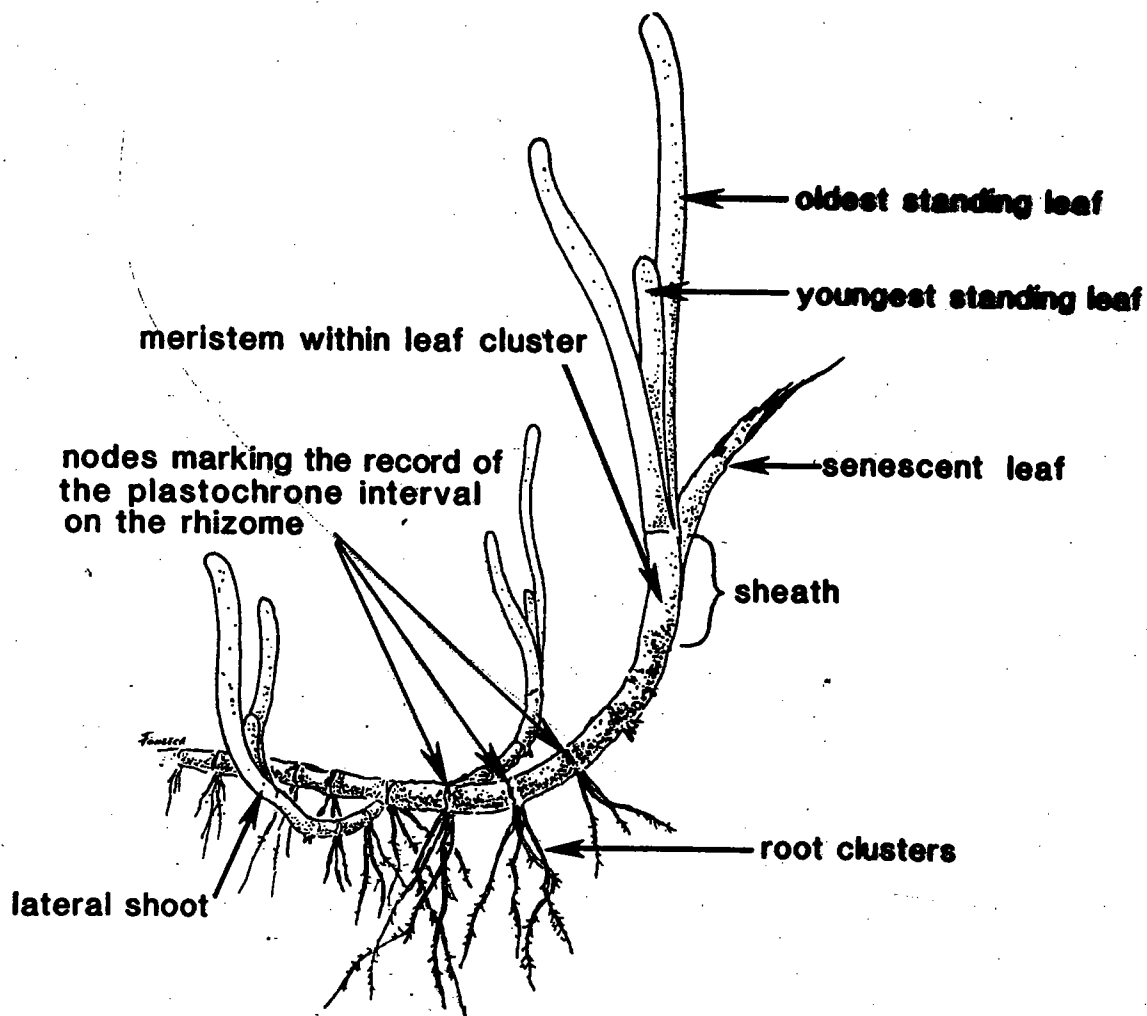


Figure 10. Major features of the morphology of *Zostera marina*

Ecological Functions and Values of Eelgrass

- Habitat for fish and Invertebrates
 - ◆ Nursery, foraging and shelter
- Provides carbon for the food chain
- Reduces erosion
 - ◇ Roots and rhizomes hold sediments in place
 - ◆ Blades dampen wave energy

Figure 2. Food Web Of Tidal Marsh-Estuarine Ecosystem

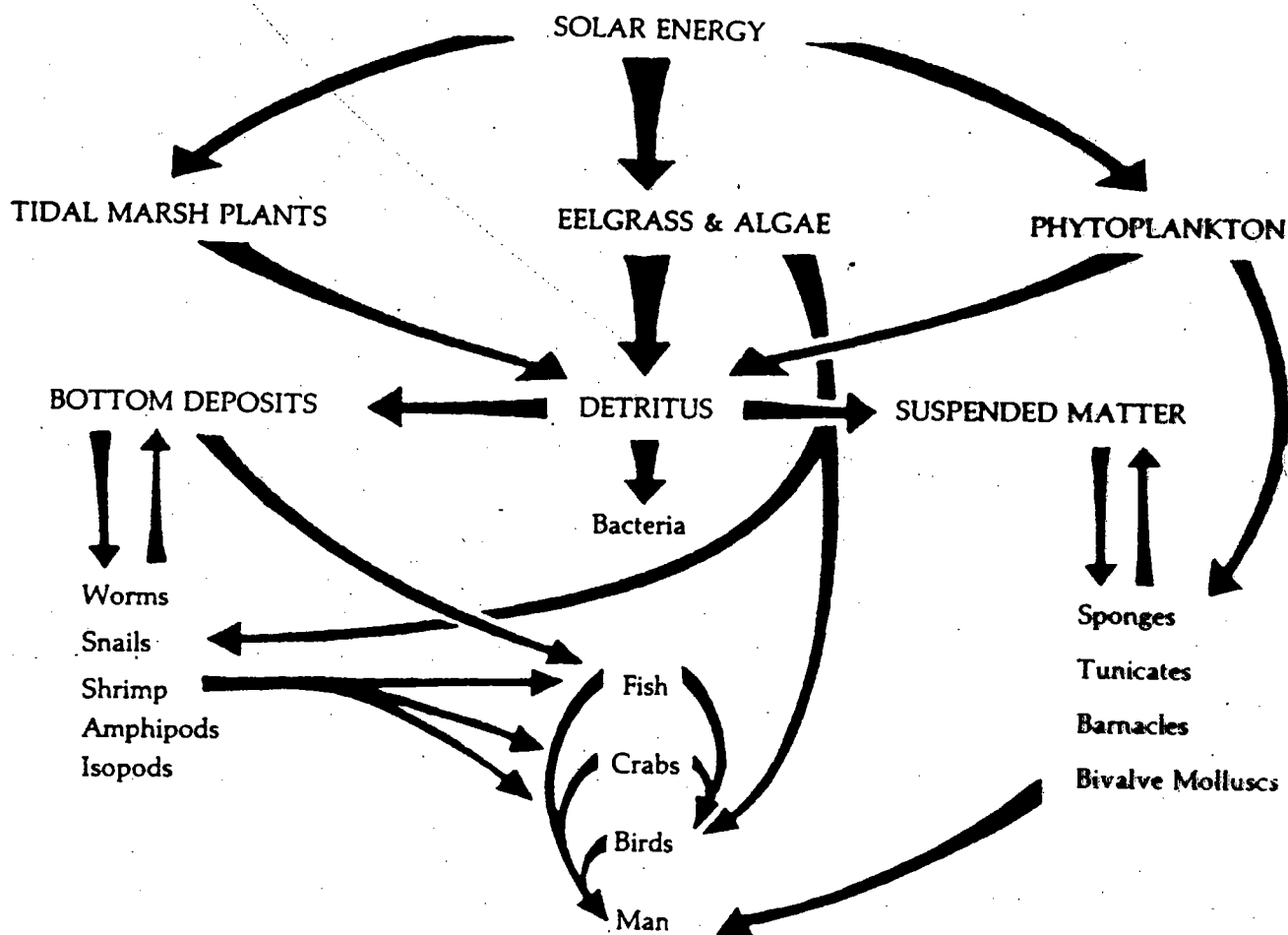


Table 4. Comparisons in primary production and fish production between different estuarine systems (from Houde and Rutherford, 1993).

System	Primary Production grams of carbon/square meter/year	Fish Catch kilograms/square hectare/year
Narragansett Bay	310	90
Peconic Bay	190	19
Chesapeake Bay	558	200
Charlestown Pond	450	100
Great South Bay	500	150

Causes of Seagrass decline

- Poor water quality
- Dredging and filling
- Boating associated impacts
 - ◆ Prop scars, shading from docks
- Fishing gear impacts
- Natural causes
 - ◆ Storms
 - ◆ "Disease"



Legal Protections for Seagrass

Federal Laws

- 1. Clean Water Act (Section 404)**
- 2. Magnuson-Stevens Act (Essential Fish Habitat)**

State Laws

Local Bylaws

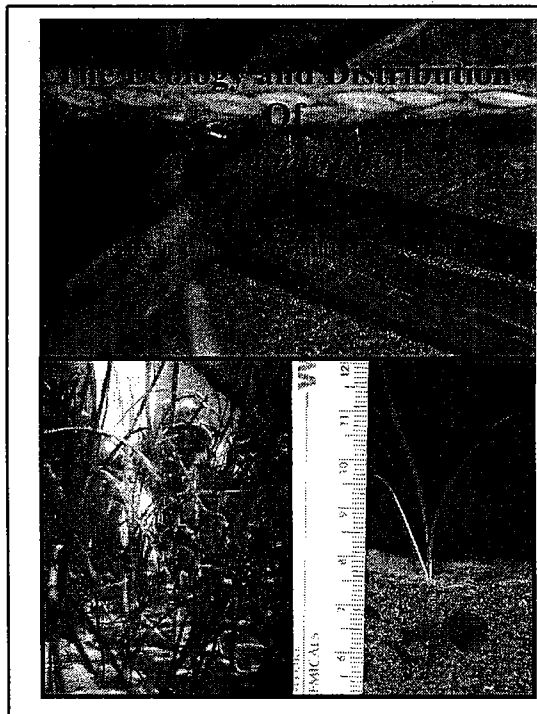
Federal Wetlands Protection Policy

"No Net Loss of Wetlands"

Avoidance

Minimization

Mitigation



Outline

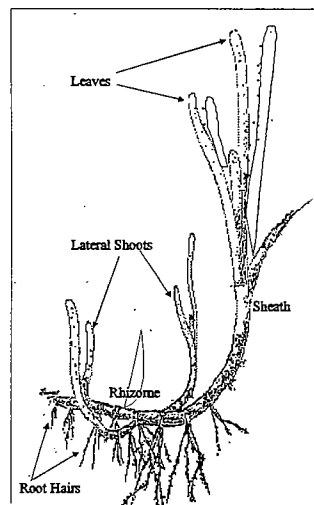
- Ecological Role of Seagrass
- Present Range of *Zostera marina* L.
- Environmental Regulation of Seagrass Distribution.
- Mapping Seagrass
- Restoration Techniques.

ENCLOSURE 3



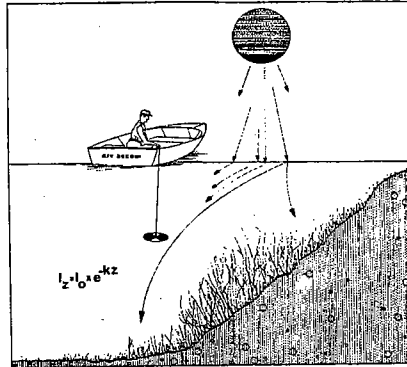
- Highly productive marine food resource, frequently rivaling agricultural cropland production.
- Well developed root structure stabilizes sediment, prevents scouring and protects benthic animals.
- Refuge and nursery for commercially valuable fin and shell fish
- Slows water, dampens wave energy promotes the accumulation of organic sediment and detritus
- Concentrates food resources, accelerates the growth deposit and filter feeders such as worms and clams

Zostera marina L.: Plant Morphology



ENCLOSURE 3

Exposure and Light Determine the Distribution Of Seagrass



North American Eelgrass, *Zostera marina* L. Habitat

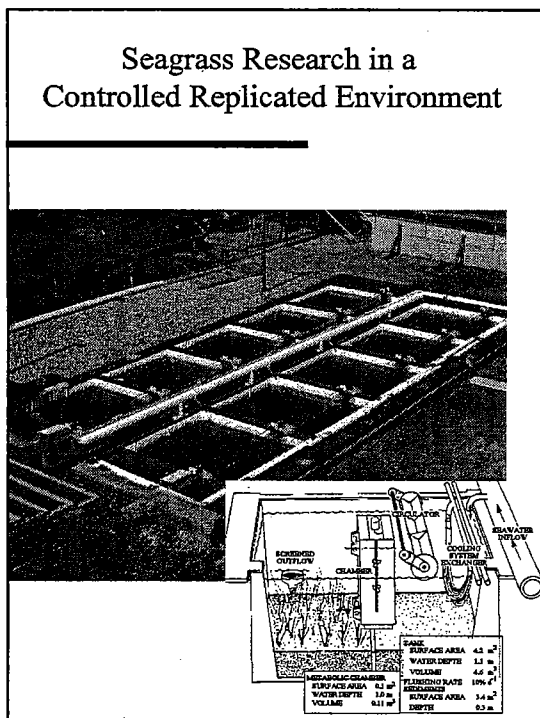
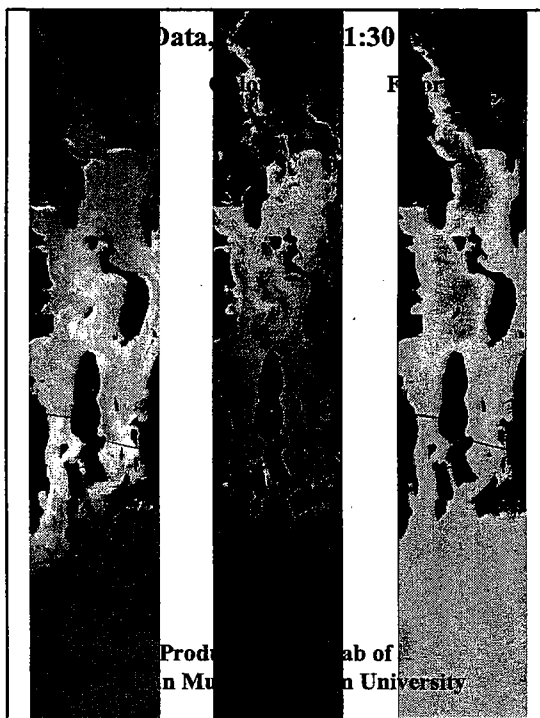


Eelgrass thrives in a broad range of environmental conditions from coarse sands and gravel in exposed locations to fine grained mud in quiescent embayments.

The North Atlantic *Zostera marina* population was nearly decimated during the 1930's by a virulent outbreak of a marine slime mold. Since the 1960's *Zostera marina* has successfully repopulated much of its former habitat.

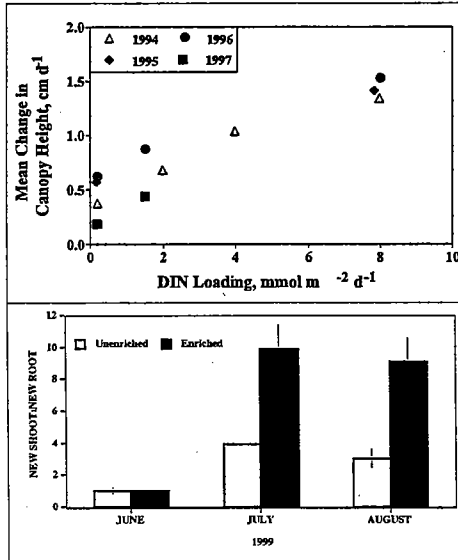
ENCLOSURE 3

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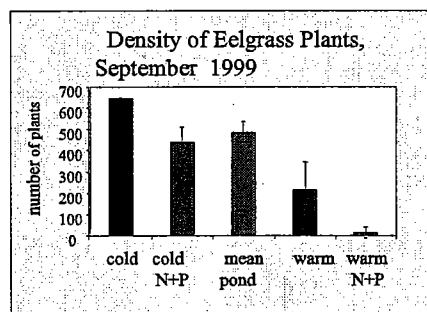


ENCLOSURE 3

Effects of Nutrient Enrichment On Seagrass Growth



Warming Temperatures and Nutrient Enrichment Can be Fatal for Seagrass

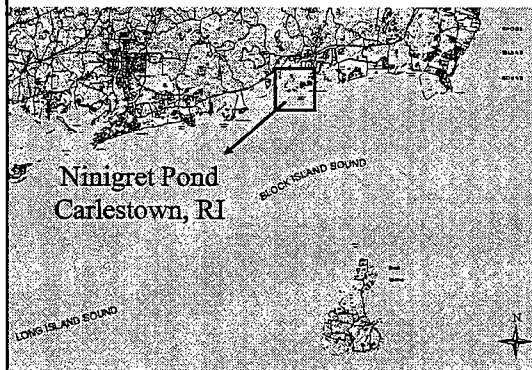


ENCLOSURE 3

Techniques for Documenting Seagrass Habitat

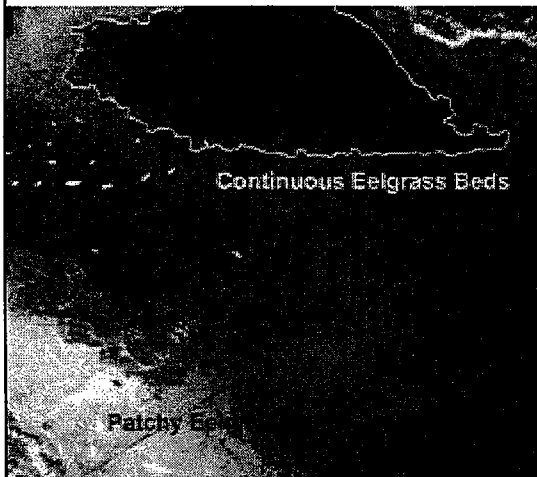
- Aerial Overflight and Photo Interpretation
- Ground Verification of Photo Interpretation
- Recent Developments in Satellite Imaging

Rhode Island's Coastal Lagoons



ENCLOSURE 3

Difficult to Determine Coverage
From Remote Sensing Images



Comparison of continuous and patchy eelgrass beds

Aerial Overflight Imaging
And Photo Interpretation



ENCLOSURE 3



Remote Sensing Image of
Ninigret Pond, Charlestown RI



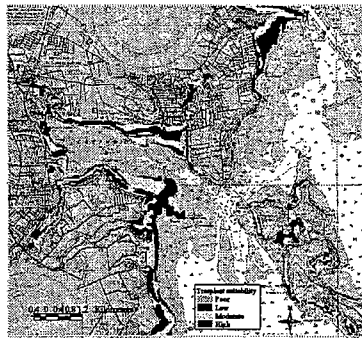
Hyperspectral image provided by Jack Mustard, Brown University

ENCLOSURE 3

Techniques for Restoring Seagrass Habitat

- Site Selection Models
- Choices in Restoration Techniques
- Turfs versus Seeds
- Details About the Use of Seeds

GIS Eelgrass Restoration Site Selection Model



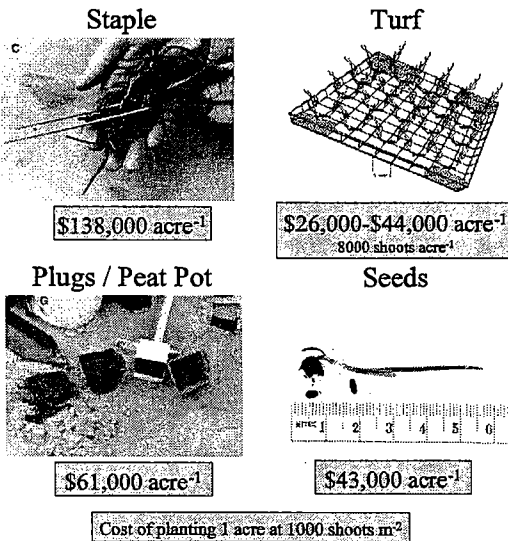
Model Parameters

- 1) Depth of current eelgrass beds
- 2) Light availability
- 3) Historical eelgrass bed location
- 4) Existing Beds

SAVE THE BAY.

ENCLOSURE 3

Cost Comparison Between 4 Common Restoration Techniques



Turfs Method

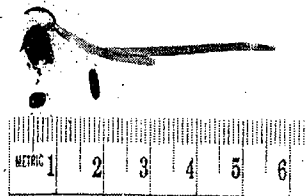
Selecting healthy plants and
preparing for transplanting



Attaching the plants to the frame with
paper ties

ENCLOSURE 3

Why Use Seeds ?



- Less labor intensive to collect and distribute
- Less destructive to the donor site
- Increased genetic diversity at restored site
- Can be held for a period time before planting

Flowering in *Zostera marina* L.

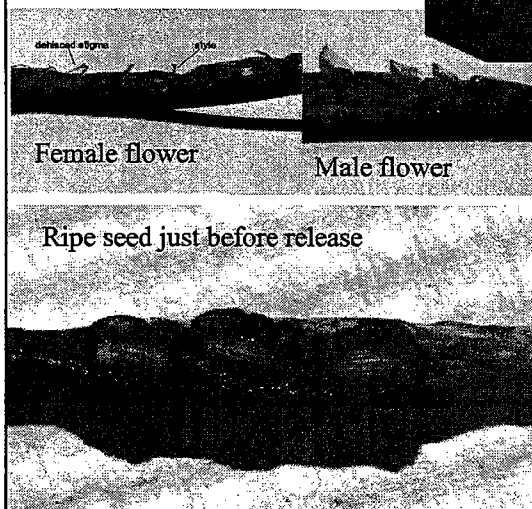
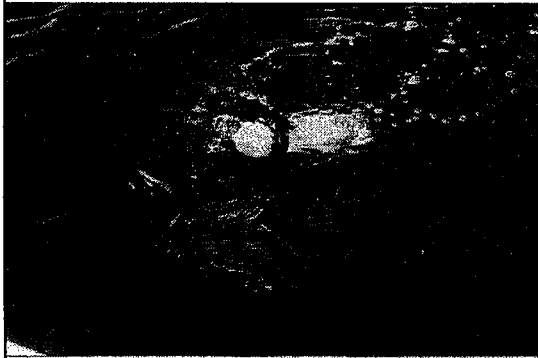


Fig. 7 A spathe that has opened to reveal mature seeds. Seeds are released after reaching this stage of development.

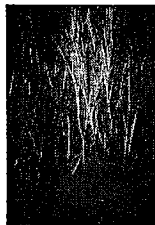
ENCLOSURE 3

Diver Returning to Boat With Flowering Stalks



Seed Collection Process

Flowering plant
Collection



Plants are held while
seeds release



Vegetative material
are removed



Tank Wash Down



Seed Recovery



Seed Holding

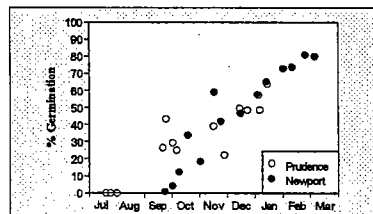
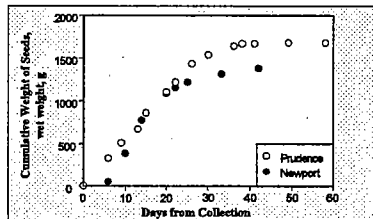


ENCLOSURE 3

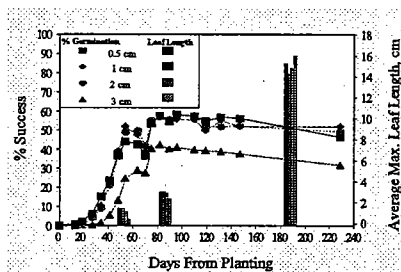
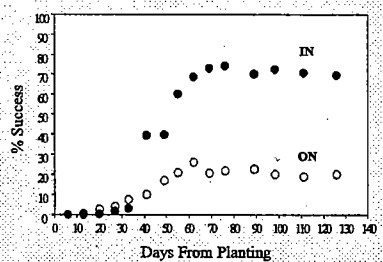
Seed Yield and Storage



Questions



Seed Planting Strategies



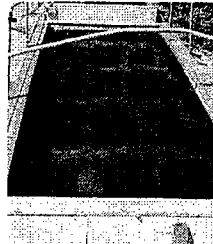
ENCLOSURE 3

Experiments on Seeding Density & Sediment Type

High Organic



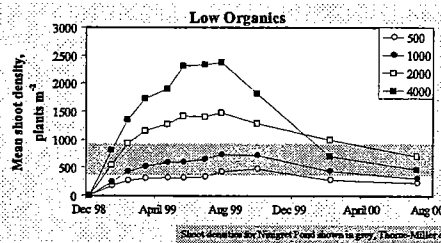
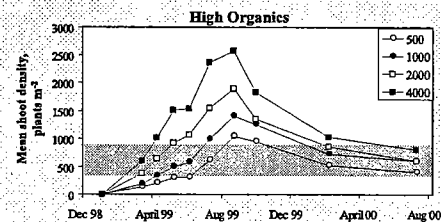
Low Organic



Sediment Characteristics

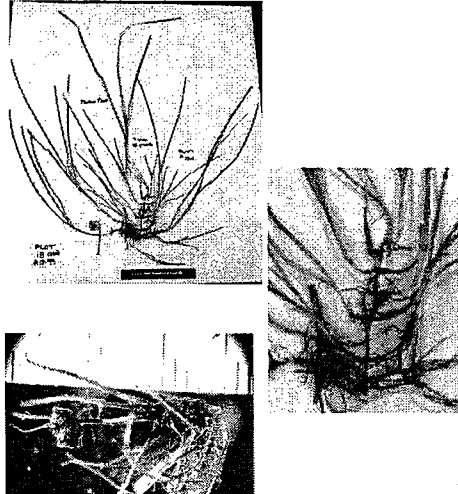
	Narragansett Bay	Rhode Island Sound
Location		
Latitude	41° 30'	41° 21'
Longitude	71° 24'	71° 32'
% Organic Content		
0-2cm	1.7	0.56
2-6cm	1.63	0.51
Pore Water		
NH ₄ (μM)	459.1	393.8
NO ₂ /NO ₃ (μM)	3.1	3.3
DIP (μM)	67	63.6
Redox Layer		
Depth, cm	1.3	2.5

Shoot Density Time-line

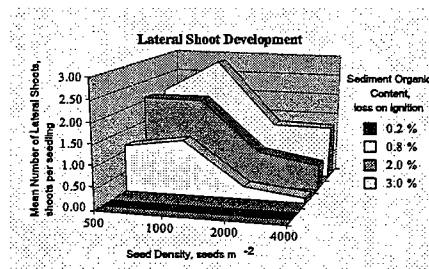
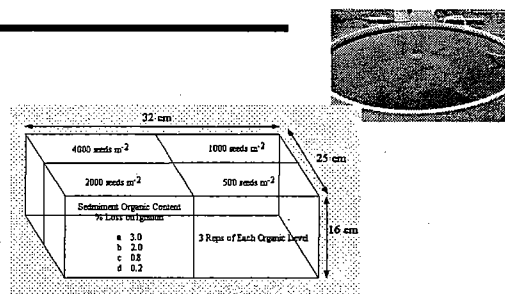


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Lateral Shoot and Node Production



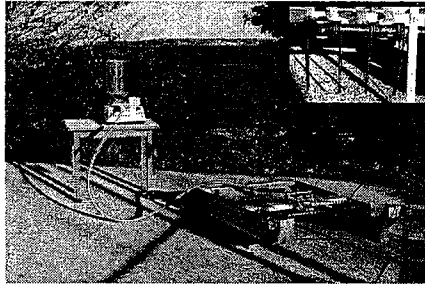
1999-2000 Sediment Organic-Seeding Density Experiment



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Making Seeding Efficient

Mechanized Seeding



Seeding Operation: how it all may work

Conclusions

- Planting seeds below the surface increases germination.
- Seeds planted just below the surface to a depth of 2.5 cm show similar germination while seeds planted below 2.5 cm showed hindered germination.
- Increasing seeding density had a negative effect on lateral shoot development.
- Increasing sediment organic content had a positive effect on lateral shoot development.
- All seeding densities came to a similar shoot density by the end of year 2, indicating a carrying capacity might be achieved.

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February 20, 2002

Newport Restoration Advisory Board
Project Committee Report
"The History of Chlorinated Diphenyl(PCB'S)"

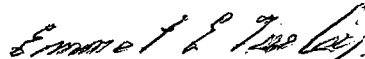
Last month I presented you with the information about the ongoing struggle between the Hudson River environmental groups and the General Electric Corporation to clean up the pollution of the river.

This month the information contains the history of Polychlorinated Biphenyls (PCB's), from discovery in the late 19th century to its role in the late 20th century as a serious threat to not only humans, but to large marine mammals, smaller fish, and birds.

Interestingly enough, many of these large electrical corporations knew of these dangers to their employees as well as to the surrounding environment, but covered up some of the evidence about sick employees and family members exposed to the PCB's.

How does this information relate to dredging? Many of the proposed dredging projects may uncover areas of buried chemicals as well as discover marine life that may have been exposed to PCB's. Being aware of the seriousness of the toxicity may create stronger controls on the disposal of dredged material.

Submitted by:



Emmet E. Turley, Chairperson

HudsonWatch.net & .org Hudson-Voice.com



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Rachel's Environment and Health News

#327 - How We Got Here -- Part 1: The History of Chlorinated Diphenyl (PCB's)

by Peter Montague
Annapolis, Maryland
March 04, 1993

If you had to pick one chemical that best exemplified our modern situation, it might well be PCB's (polychlorinated biphenyls).

PCB's were first manufactured commercially in 1929 by the Swann Corporation, which later became part of Monsanto Chemical Company of St. Louis, Missouri.[1] Monsanto

then

licensed others to make PCB's and the product took off. PCB's conduct heat very well, but do not conduct electricity,

change

and they do not burn easily. Furthermore, they do not

chemically--they are stable--and they are not soluble in water. Therefore they are ideal insulators in big electrical transformers and capacitors (devices that store electricity). As electricity came into widespread use during the first half of this century, equipment suppliers like G.E. and Westinghouse became major users of PCB's.

industrial

Many of the characteristics that make PCB's ideal in applications create problems in the environment. Like many

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other chlorinated hydrocarbons, PCB's are soluble in fat, though not in water, so they tend to accumulate in living things and to enter food webs, where they concentrate. Larger, older predators tend to accumulate PCB's in their fatty tissues, including their eggs (in the case of birds and fish) and their milk (in the case of mammals). PCB's were first recognized as an environmental problem in 1966 when

a Swedish researcher reported finding them in 200 pike from all over Sweden, in other fish, and in an eagle.[2] For the next decade, scientists accumulated information about

PCB's, finding them disrupting food webs all over the planet. By 1976, the destruction wrought by PCB's was so obvious and so well understood that even the U.S. Congress comprehended the danger and took action, outlawing the manufacture, sale, and distribution of PCB's except in

"totally enclosed" systems. Between 1929 and 1989, total world production of PCB's (excluding the Soviet Union) was 3.4 billion pounds, or about 57 million pounds per year. Even after the U.S. banned PCBs in 1976, world production continued at 36 million pounds per year from 1980-1984

and 22 million pounds per year, 1984- 1989. The end of PCB production is still not in sight.[3]

billion The whereabouts of 30 percent of all PCB's (roughly a pounds) remains unknown. Another 30 percent reside in landfills, in storage, or in the sediments of lakes, rivers, and estuaries. Some 30 percent to 70 percent remain in use. The characteristics of PCB's (their stability and their solubility in

fat) tend to move them into the oceans as time passes. Nevertheless, it is estimated that only one percent of all

PCB's have, so far, reached the oceans.[3]

The one percent that HAVE reached the oceans are causing major problems. As noted above, PCB's tend to concentrate in the food chain; the higher you are on the food chain, the greater the concentration of PCB's. Large fish, and creatures that eat large fish, tend to accumulate thousands of parts of million (ppm) in their flesh. Furthermore, by a cruel twist of fate, large birds and large marine mammals (seals, sea lions, whales, and some dolphins) lack enzyme systems to efficiently detoxify PCB's. As a result, PCB's build up in the

bodies of oceanic predators and are passed to their offspring through eggs (in the case of fish and birds) and milk (in the case of mammals). PCB's mimic hormones and are a powerful disruptor of the endocrine system that governs reproduction. Marine mammals are already having trouble reproducing.[4] It is entirely possible that, as more PCB's reach the oceans, all large mammals will disappear.[5]

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are
the
Humans, too, are contaminated by PCB's and are passing these powerful toxins to their infant children through breast milk. In the U.S. and other industrialized countries, PCB's present in breast milk at about 1 part per million (ppm) in milk fat. An infant drinking milk contaminated at this level will take in a quantity of PCB's that is 5 times as high as the recommended "allowable daily intake" for an adult, as established by the World Health Organization.[6]

Children exposed in the womb to PCB's at levels considered "background levels" in the U.S. have been found to experience hypotonia (loss of muscle tone) and hyporeflexia (weakened reflexes) at birth, delays in psychomotor development at ages 6 and 12 months, and diminished visual recognition memory at 7 months.[7]

How did we get here?

name
In 1937--just eight years after Swann Chemical began manufacturing PCB's in commercial quantities--the Harvard School of Public Health hosted a one-day meeting on the problem of "systemic effects" of certain chlorinated hydrocarbons including "chlorinated diphenyl" (an early for PCB's).[8] The meeting was attended by representatives from Monsanto, General Electric, the U.S. Public Health Service, and the Halowax Corporation, among others.

using
Before World War I, the Halowax Corporation began manufacturing chlorinated naphthalenes as a coating for electric wire and companies like General Electric began it. The president of Halowax, Sanford Brown, told the meeting that they had observed no problems in their workers until "the past 4 or 5 years... Then we come to the higher stages [greater number of chlorine atoms in the mixture], combined with chlorinated diphenyl and other products, and suddenly this problem is presented to us." [8]

even
of
By the mid-1930s, workers at Halowax and at G.E., and some of their customers, were breaking out with chloracne--small pimples with dark pigmentation of the exposed area, followed by blackheads and pustules. In 1936 three workers at the Halowax Company died, and Halowax then hired Harvard University researchers to expose rats to these chlorinated compounds, to see if they could discover the underlying cause. The Harvard researchers made "a number of estimates of chlorinated hydrocarbons in the air

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different factories," then designed experiments to expose rats to similar levels. They reported that "the chlorinated diphenyl is certainly capable of doing harm in very low concentrations and is probably the most dangerous [of the chlorinated hydrocarbons studied]." [8] And, they said, "These experiments leave no doubt as to the possibility of systemic effects from the chlorinated naphthalenes and chlorinated diphenyls." [8]

From a brief report on the one-day conference, we can gather that problems caused by PCB exposures were serious and widely known. Mr. F.R. Kaimer, assistant manager of General Electric's Wireworks at York, Pa., said, "It is only 1 1/2 years ago that we had in the neighborhood of 50 to 60 men afflicted with various degrees of this acne about which you all know. Eight or ten of them were very severely afflicted-- horrible specimens as far as their skin conditions was concerned. One man died and the diagnosis may have attributed his death to halowax vapors, but we are not sure of that...." [8]

G.E.'s medical director, Dr. B. L. Vosburgh of Schenectady, N.Y., attended the meeting. He said, "About the time we were having so much trouble at our York factory some of our customers began complaining. We thought we were having a hysteria of halowax mania throughout the country."

Monsanto Chemical Company was represented at the meeting by R. Emmett Kelly. Mr. Kelly told the meeting, "I can't contribute anything to the laboratory studies, but there has been quite a little human experimentation in the last several years, especially at our plants where we have been manufacturing this chlorinated diphenyl." He went on to describe the results of Monsanto's human experiments: "A more or less extensive series of skin eruptions which we were never able to attribute as to cause, whether it was impurity in the benzene we were using or to the chlorinated diphenyl." [8]

G.E.'s F.R. Kaimer described the HUMAN reaction of G.E. executives to the disfigurement and pain of G.E. workers exposed to PCB's: "[W]e had 50 other men in very bad condition as far as the acne was concerned. The first reaction that several of our executives had was to throw it out-- get it out of our plant. They didn't want anything like that for treating wire. But that was easily said but not so easily done. We might just as well have thrown our business

to the four winds and said, 'We'll close up,' because there was no substitute and there is none today in spite of all the efforts we have made through our own research laboratories to find one." [8] And so G.E. executives--contrary to their

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personal ethics--reached a business decision to continue using PCB's.

[To be concluded next week.]

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►To read: 'How We Got Here -- Part 2: Who Will Take Responsibility For PCB's', [Click Here!](#)

in [1] Robert Risebrough and Virginia Brodine, "More Letters the Wind," in Sheldon Novick and Dorothy Cottrell, editors, OUR WORLD IN PERIL: AN ENVIRONMENT REVIEW (Greenwich, Conn.: Fawcett, 1971), pgs. 243-255.

NEW [2] Soren Jensen, "Report of a New Chemical Hazard," SCIENTIST Vol. 32 (1966), pg. 612.

Modern [3] Kristin Bryan Thomas and Theo Colborn, "Organochlorine Endocrine Disruptors in Human Tissue," in Theo Colborn and Coralie Clement, editors, CHEMICALLY-INDUCED ALTERATIONS IN SEXUAL AND FUNCTIONAL DEVELOPMENT: THE WILDLIFE/HUMAN CONNECTION [Advances in Environmental Toxicology Vol. XXI] (Princeton, N.J.: Princeton Scientific Publishing Co., [1992].) pgs. 342-343.

on [4] See, for example, Robert L. DeLong and others, "Premature Births in California Sea Lions: Association With High Organochlorine Pollutant Residue Levels," SCIENCE Vol. 181 (Sept. 21, 1973), pgs. 1168-1170; and Peter J. H. Reijnders, "Reproductive failure in common seals feeding fish from polluted coastal waters," NATURE Vol. 304 (Dec. 4, 1986), pgs. [456-457.]456-457.

Foresight [5] Shinsuke Tanabe, "PCB Problems in the Future: from Current Knowledge," ENVIRONMENTAL POLLUTION Vol. 50 (1988), pgs. 5-28.

[6] Kristin Bryan Thomas and Theo Colborn, "Organochlorine Endocrine Disruptors in Human Tissue," in Theo Colborn and Coralie Clement, editors, CHEMICALLY-INDUCED ALTERATIONS IN SEXUAL AND FUNCTIONAL DEVELOPMENT: THE WILDLIFE/HUMAN CONNECTION [Advances in

Modern

Environmental Toxicology Vol. XXI] (Princeton, N.J.: Princeton Scientific Publishing Co., [1992].) pgs. 365-394. For the comparison of U.S. breast-fed infants' intake vs. World health Organization's standard for adults, see pg.

385.

[7] Hugh A. Tilson and others, "Polychlorinated Biphenyls and the Developing Nervous System: Cross-Species Comparisons," NEUROTOXICOLOGY AND TERATOLOGY Vol. 12 (1990), pgs. 239-248.

[8] Cecil K. Drinker and others, "The Problem of Possible Systemic Effects From Certain Chlorinated Hydrocarbons," THE JOURNAL OF INDUSTRIAL HYGIENE AND TOXICOLOGY Vol. 19 (September, 1937), pgs. 283- 311. Thanks to Bridget Barclay of the Hudson River Sloop Clearwater for sending us this revealing article. Ms. Barclay and her colleagues at Hudson Clearwater have worked tirelessly for years to force a sensible cleanup of PCB's that G.E. dumped, contaminating the length of the Hudson

River;

Hudson Clearwater can be reached in Poughkeepsie at (914) 454-7673.

Descriptor terms: pcbs; ge; chlorine; sandford brown; halowax corp; phs; westinghouse; electricity; monsanto; wildlife; fish; mo; landfilling; oceans; swann corp.

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Rachel's Environment and Health News

#329 - How We Got Here -- Part 2: Who Will Take Responsibility For PCB's

by Peter Montague
Annapolis, Maryland
March 18, 1993

The story of PCB's is a morality play for our time.

PCB's (polychlorinated biphenyls) were discovered during the 19th century, when petroleum was still more of a curiosity than a recognized foundation for the world's most powerful civilization. As the automobile came into wider use during this century (Henry Ford invented the assembly line around 1910), the demand for gasoline grew. As gasoline was extracted from crude oil, great quantities of other chemicals,

like benzene, were left over. Chemists started playing around with these chemicals, to see if something useful could be made from smelly by-products, like benzene.

If you heat benzene under the right conditions, you can glue two benzene rings together, creating diphenyl. If you then expose the diphenyl to chlorine gas under the right conditions, you can create chlorinated diphenyls, or biphenyls as we call them today. Adding more or less chlorine gives compounds with differing properties, and thus

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don't PCB's (polychlorinated biphenyls, all 75 of them) came into being. They aren't soluble in water, they don't burn, they conduct electricity, they do not degrade during use, and they conduct heat very well--viola! An excellent candidate for a variety of uses in the burgeoning fields of electric power equipment and electronics.

had By 1914 enough PCB's had already escaped into the environment to leave measurable amounts in the feathers of birds held in museums today.[1]

had By the mid-1930s, as we saw earlier (RHWN #327) Monsanto was producing PCB's commercially and PCB's created a public health problem sufficient in size to attract academic researchers, the U.S. Public Health Service, and several large industrial producers and users of PCB's.

In 1936, a senior official with the U.S. Public Health Service described a wife and child, both of whom had developed chloracne, a combination of blackheads and "pustules," merely from contact with a worker's clothes. The same official wrote, "In addition to these skin lesions, symptoms of systemic poisoning have occurred among workers inhaling these fumes." [2]

department By 1947, E.C. Barnes of Westinghouse's medical wrote, in an internal company memo, that long-term exposure to PCB fumes "may produce internal bodily injury which may be disabling or could be fatal." [3]

By 1959, the assistant director of Monsanto's Medical Department would write to the Administrator of Industrial Hygiene at Westinghouse saying, "...sufficient exposure, whether by inhalation of vapors or skin contact, can result in chloracne which I think we must assume could be an indication of a more systemic injury if the exposure were allowed to continue." [4]

health In 1968, when 1300 residents of Kyushu, Japan, fell ill after eating rice contaminated with PCB's, the world's public establishment woke up from a long sleep and began to examine PCB's, which by this time were everywhere.

life In late 1971, a group of Westinghouse staff met to discuss PCB's and they noted that PCB's concentrate in the food chain. A memo summarizing the meeting said, "It was generally concluded that... there is sufficient evidence that pcbs can be deleterious to the health of animal and human

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and that the risks of ignoring the evidence that does exist was [sic] inappropriate for Westinghouse." [5] Yet, the 1971 memo recommended continued use of PCB's.

Nearly 20 years later, in the late 1980's, researchers began to find that workers exposed to PCB's were dying of skin cancer and, perhaps, of brain cancer. Westinghouse and Monsanto maintain that they always informed their workers completely about the hazards of PCB's, but during the 1990's, workers have begun to sue for damages, saying the companies misled them.

Recently in a court in Travis County, Texas, Westinghouse released a 22-page memo that bears no date, but which company officials say was written by a Westinghouse staff lawyer in 1987 or 1988. [6] In the memo, the Westinghouse lawyer describes extensive paper and microfilm records held by the Westinghouse Industrial Hygiene Department: "The majority of the documents in Industrial Hygiene's files are potential 'smoking gun' documents," the memo says. The memo goes on, "The files are filled with documentation which critiques and criticizes, from an industrial hygiene perspective, Westinghouse manufacturing and non-manufacturing operations. This documentation often times points out deficiencies in Westinghouse operations and suggests recommendations to correct these deficiencies. Industrial Hygiene's files contain information which details the various chemical substances used at Westinghouse sites over the years and often times the inadequacies in Westinghouse's use and handling of the substances. The files contain many years of employee test results, some of them unfavorable," the memo says. [7]

The memo says that Westinghouse executives must ask certain questions before deciding to keep or destroy the smoking gun records. The first question is, "What are the chances of litigation? Is it pending or imminent?" The second question is, "In the case of litigation, which party would have the burden of proof?"

The memo then says, "We recommend that all such files generated prior to 1974 be discarded.... In our opinion, the risks of keeping these files on the whole substantially exceed the advantages of maintaining the records...."

Westinghouse officials deny that the memo was acted upon. They say they still have all the company's files intact. However, in a lawsuit against Westinghouse by Nevada

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Power and Light (NP&L), Westinghouse did not produce documents, such as correspondence between Westinghouse and Monsanto, requested by NP&L in a "discovery" proceeding. Monsanto, on the other hand, did produce correspondence with Westinghouse officials. [4] NP&L is suing Westinghouse, G.E. and Monsanto for \$48.5 million in compensatory damages for costs the utility says it incurred because of PCB's in electric power equipment.

Furthermore, in sworn testimony in the NP&L case, three Westinghouse employees or former employees described how files that they maintained about PCB's were taken from them by members of Westinghouse legal staff in the 1980's and never returned to them.

It is not clear why Westinghouse handed over the "smoking gun" memo to opposing counsel in the Texas suit. In any case, Westinghouse attorneys tried to have the document declared "privileged" so that it would remain under wraps. On February 9, 1993, Texas Judge Paul R. Davis ruled against Westinghouse, saying the memo "falls within the crime/fraud exemption to privileged documents" under Texas law because, the Judge said, the memo was "prepared, and describe[s] a plan, to commit fraud on the courts of this nation." Westinghouse denies fraudulent intention, but destroying documents that might be needed in foreseeable litigation is forbidden under U.S. law.

Westinghouse will have many opportunities to redeem its good name in the next few years. If company officials still have all their company records dating back to the 1930's, they will be able to produce relevant documents during "discovery" proceedings in dozens of lawsuits now impending or already filed. More than a thousand individuals have already filed lawsuits against Westinghouse, seeking compensation for alleged damages from workplace exposures.

During this '90s, the PCB morality play will move through the courts, where Chapter 11 bankruptcy may be the only way out for the purveyors of PCB's.

Some may see in this history the malevolent machinations of corporate criminals. But others may find in this story well-meaning individuals trapped in circumstances they believe forced them to make choices that they, as individuals, could never condone.

In RHWN #327 we heard General Electric's F.R. Kaimer describe the HUMAN reaction of G.E. executives to the disfigurement and pain of GE workers exposed to PCB's:

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that "[W]e had 50 other men in very bad condition as far as the acne was concerned. The first reaction that several of our executives had was to throw it out--get it out of our plant. They didn't want anything like that for treating wire. But was easily said but not so easily done. We might just as well have thrown our business to the four winds and said, 'We'll close up,' because there was no substitute and there is none today in spite of all the efforts we have made through our own research laboratories to find one." [7]

In the end, it does not matter what motivated the actors in our PCB story. Whether they were motivated by good or evil, the necessary remedy is the same.

As a society, and as a species, we cannot survive the launching of many more families of chemicals like PCB's or CFC's. Yet the corporate form of organization shields those who launch such chemicals, preventing them AS INDIVIDUALS from feeling the consequences of their actions. The way out of this thicket is to give back liability to all individuals, removing the corporate shield that prevents individuals from feeling the consequences of their own actions. Through reform of the corporate charter, we can return to everyone their essential human-ness, their responsibility for their own choices in their own lives.

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► Back to Part 1:

The History of Chlorinated Diphenyl (PCB's)

in [1] Robert Risebrough and Virginia Brodine, "More Letters the Wind," in Sheldon Novick and Dorothy Cottrell, editors, OUR WORLD IN PERIL: AN ENVIRONMENT REVIEW (Greenwich, Conn.: Fawcett, 1971), pgs. 243-255.

[2] E.C. Barnes quoted in Michael Schroeder, "Did Westinghouse Keep Mum on PCBs?" BUSINESS WEEK August 12, 1991, pgs. 68-70.

[3] Letter from Elmer P. Wheeler of Monsanto, to H. Wilbur Speicher of Westinghouse, October 23, 1959.

dated [4] Memo from G.W. Wiener, Research Director, Power Systems, Westinghouse, titled "Minutes of pcb status," December 28, 1971.

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[5] Stuart Miehler, "Westinghouse Lawyer Urged in '88 Note That Toxic- Safety Records Be Destroyed." WALL STREET JOURNAL February 26, 1993, pg. A-4.

[6] Undated "smoking gun" memo by Westinghouse attorney Jeffrey Bair and C.W. Bickerstaff, then Manager of Corporate Industrial Hygiene for Westinghouse.

[7] Cecil K. Drinker and others, "The Problem of Possible Systemic Effects From Certain Chlorinated Hydrocarbons," THE JOURNAL OF INDUSTRIAL HYGIENE AND TOXICOLOGY Vol. 19 (September, 1937), pgs. 283- 311.

Descriptor terms: pcbs; benzene; monsanto; phs; westinghouse; chloracne; kyushu, japan; japan; tx; nevada power & light; fraud; ge; petroleum; chlorinated hydrocarbons.

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The History of Chlorinated Diphenyl \(PCB's\)](#)

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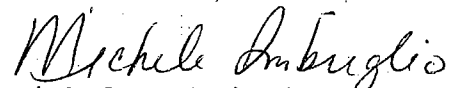
3/7/02

Dear RAB Members:

Enclosed please find a copy of the minutes of the February 20, 2002, RAB meeting.

If you have any questions or concerns, please contact me at (401) 841-7714.

Sincerely,


Michele Imbriglio

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